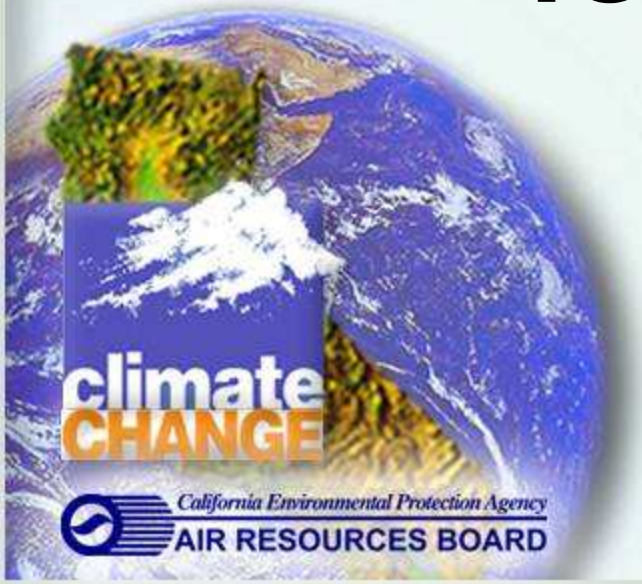
AB 32 and the California Petroleum Refinery Sector

Greenhouse Gas Reporting

Technical Discussion



July 17, 2007
Sacramento

Agenda

- Review of reporting basics
- Refinery Reporting Regulation Methodologies
  - Regulatory Concepts Paper
- Exploration and Production Sector Reporting
- Co-Generation Update
- Verification Update
- CCAR/URS Discussion Paper

Proposed Reporting Basics

- Annual reporting and verification on a facility basis
- Stationary combustion, process, fugitives
- Purchased energy usage (steam/heat, electricity)
- No mobile source requirements
- Gases as specified in the regulation
  - CO2, CH4, N2O, HFCs

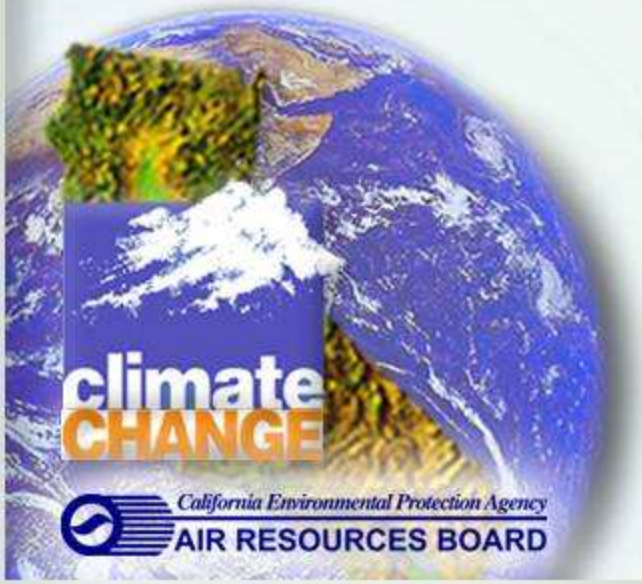
Defining Facility Boundaries

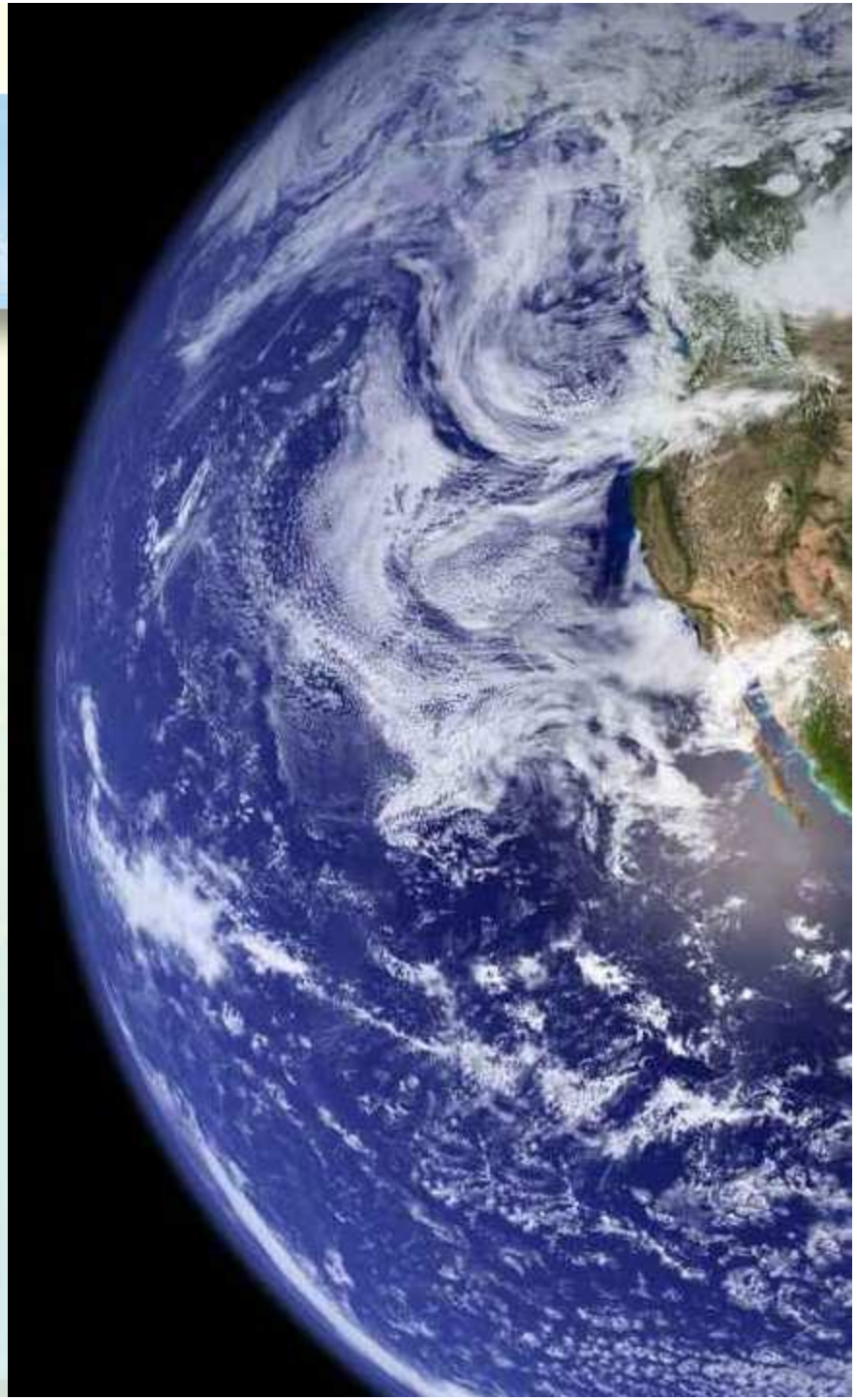
- Sources of GHGs on contiguous or adjacent properties
- Common operational control
- Within single two-digit SIC code?
- Exceptions for production facilities?
  - Often not contiguous or adjacent
  - Define facility according to air district permit?

Regulation to Specify

- Core GHG data verification requirements
- Accreditation requirements for verifiers
- Conflict-of-interest limitations
- ARB oversight

Refinery Reporting Regulation Methodologies





Stationary Combustion – CO_2

- Refinery Fuel Gas
  - HHV – hourly or hourly average
  - CC – daily
  - Calculate a fuel specific EF
    - EF = CC/HHV
    - Use EF and hourly HHV to calculate CO_2 emissions
- Natural Gas
  - HHV weekly w/ EF
  - CC monthly (calculate and report EF)

Process Emissions – Hydrogen Plants

$$E_{CO2} = FSR \times CF \times 44/12$$

FSR = feedstock supply rate

CF= carbon fraction in feedstock

44/12 = carbon to CO_2 conversion

Natural Gas – CC weekly

RFG, naphtha – CC daily

Hydrogen Plant – Process Emissions

Calculation of CO_2 Emissions Using the Hydrogen Production Rate Emissions

Two Issues = Limited Applicability

1). RFG feedstock – H_2 introduced with no associated emission = overestimation

2). H_2 recycled as fuel with PSA tail gas = underestimation

Asphalt Production

- Uncontrolled emissions – EPA EF
  2,555 scf CH_4/Mbbl
- Flaring – AQMD emissions reporting data
- Uncontrolled Storage Tanks – EPA TANKS

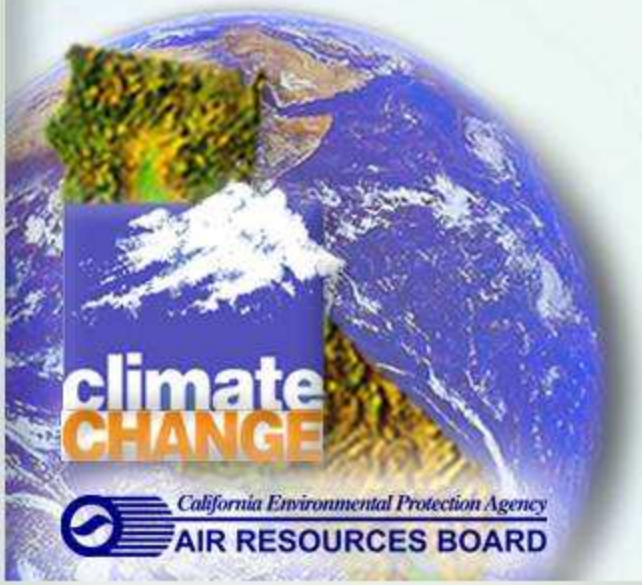
Fugitive Emissions

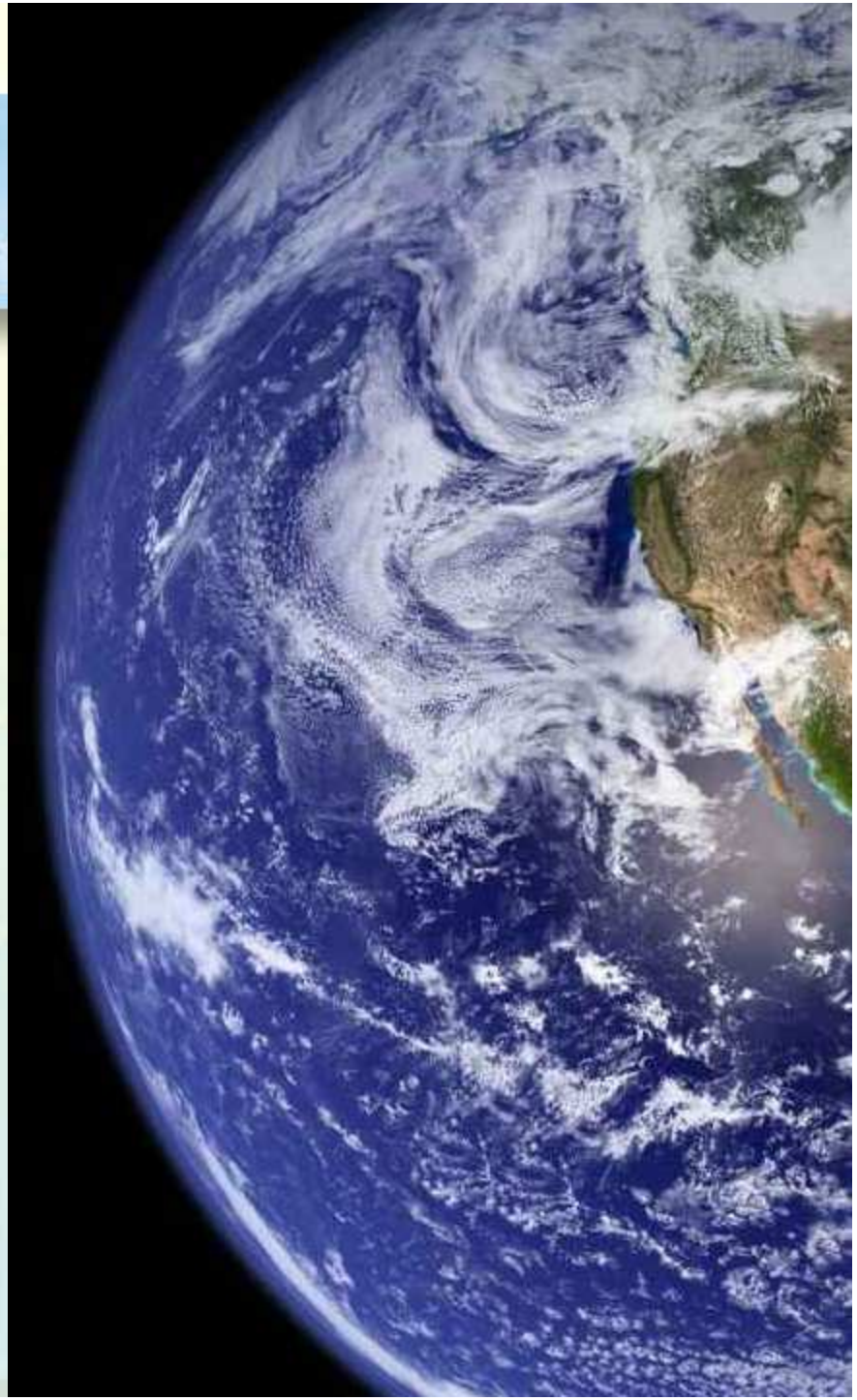
- Wastewater
  - IPCC methodology
- Storage Tanks
  - Uncontrolled tanks – EPA TANKS
- Process Vents
  - API methodology
- Flaring
  - AQMD reporting data – NHMC composition?

Oil Production Sources

- Subject to reporting as a major source under the 25,000 metric ton threshold
  - Combustion sources only
  - Process, fugitives may be added later
- Methods and fuel sampling requirements would be similar to refinery sector
  - Associated gas also highly variable
- Cogeneration emissions allocation also would be specified in the regulation
  - Facility-specific efficiency values

Cogeneration: Emissions Allocation





Cogeneration: Emissions Allocation

- Registry Efficiency Allocation
  - Preferred Approach
  - Based on Actual Efficiencies
    - Thermal energy and electricity production
- Desire to be more specific
  - Topping Cycle Plants
    - Electric generation is at the top or beginning of the cycle and other thermal energy streams sent to processes after electricity production
  - Bottoming Cycle Plants
    - Recovers steam or heat from a process stream to produce electricity.

Registry Efficiency Method: GHG Emissions Allocation

Thermal Energy	Electricity
$E_H = \frac{H/e_H}{H/e_H + P/e_P} \times E_T$	$E_P = E_T - E_H$

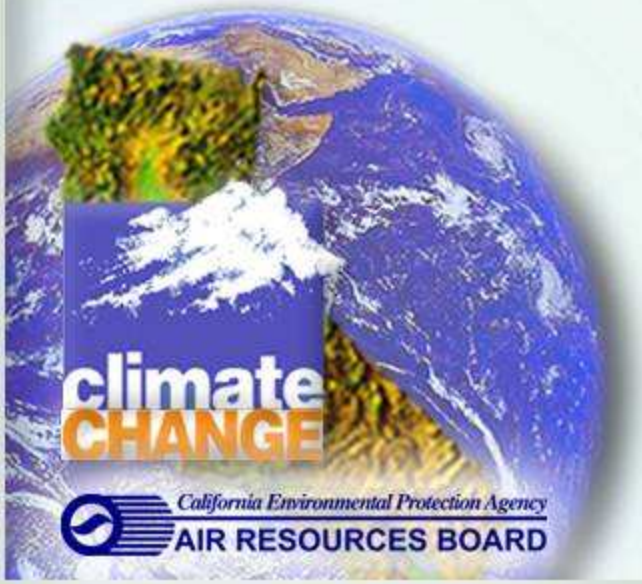
Where:

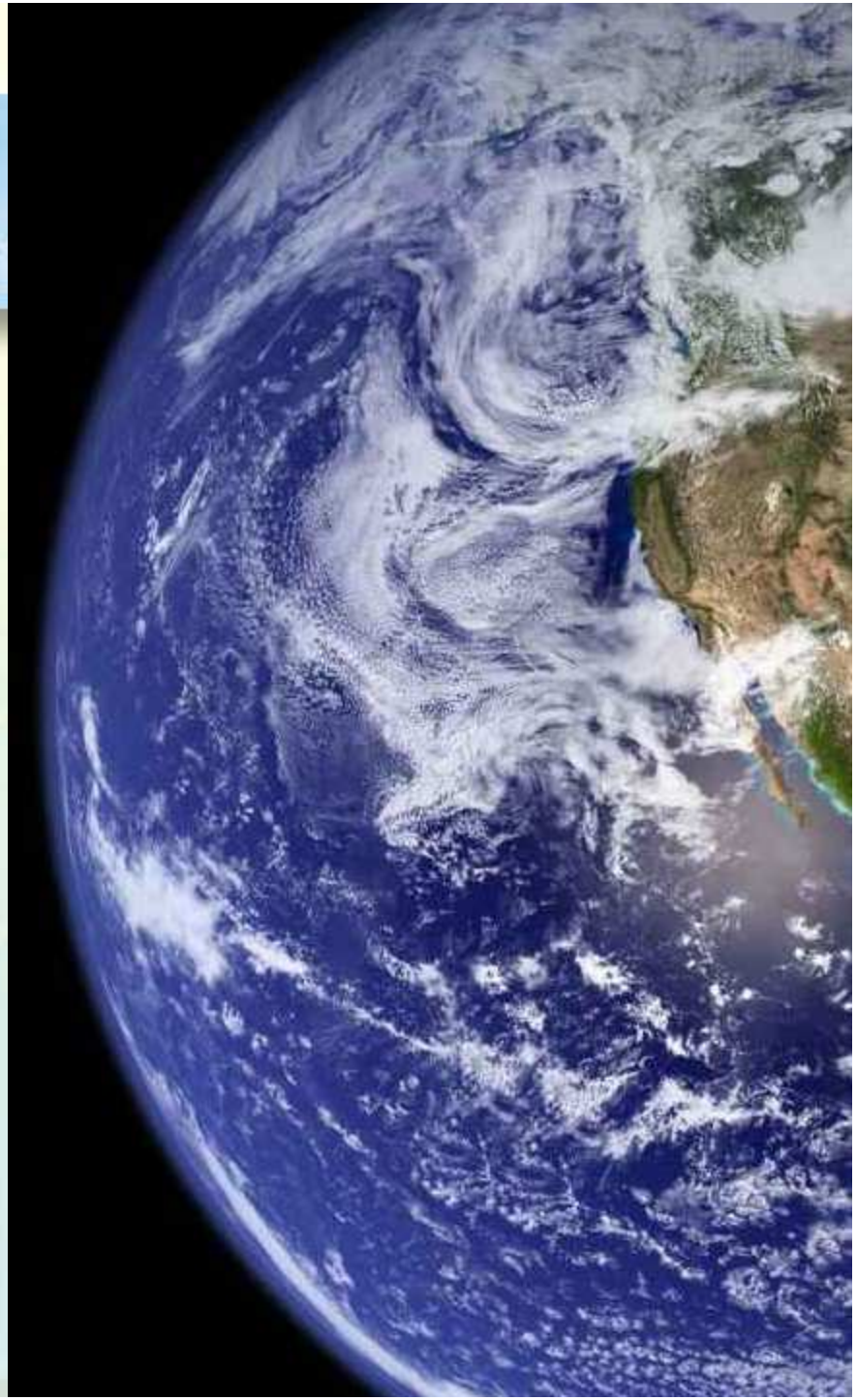
E_H = Emissions allocated to steam production
H = Total steam (or heat) output (MMBtu)
e_H = Efficiency of steam (or heat) production
P = Total electricity output (MMBtu)
e_P = Efficiency of electricity generation
E_T = Total direct emissions of the CHP System
E_P = Emissions allocated to electricity production

Cogeneration: Emissions Allocation

- Consulting with CCC and CAC/EPUC
- Facility-Specific Efficiencies
- May Schedule Additional Meeting to Discuss

Verification: Initial Concepts





Verification: Initial Proposal

- Require annual third-party verification for refineries, utilities, and power plants and co-generation facilities selling power to the grid or other users
- Require triennial third-party verification for cement plants and other stationary combustion sources ≥ 25,000 tons CO2
- Require annual third-party verification for anyone entering a future market

Third Party Verification

- All verifiers to be trained under ARB approved curriculum
  - Demonstrated expertise
  - Consistency in verification
  - Will have sector specific training
    - Refineries
    - Utilities
    - Cement

Verification Activities

- Identify sources and review data management systems
- Focus on most significant and uncertain sources
  - Uncertainty risk based sampling of estimates
- Differences exceeding 5 percent considered significant
- Detailed, confidential verification report to facility and ARB

Reporting and Verification Timing Proposal

- Power and cogeneration plants without additional facility sources or purchases to report
  - Emissions reports due by April 30
  - Verification complete by Aug 31
- Utilities, refineries, cement plants and other stationary combustion sources
  - Emissions reports due by Aug 31
  - Verification complete by December 31

Conflict of Interest

- Term Limit
  - Verifiers to be changed after 6 years of conducting verification activities
  - Allowed to resume with client after 1 year off cycle for verification
- Conflict of Interest Policy
  - Must agree not to act on behalf of reporting facility as both consultant and verifier concurrently or within any 3 year period
  - Modeled after CEC guidance for CCAR

Accreditation

- ARB to specify requirements necessary to become verifier
- Propose following fairly stringent international and CCAR approaches
- Only an accredited firm may present a verification report.
  - Firm must have at least two lead verifiers

Verification Oversight

- ARB staff responsible for enforcing regulation
- Verification process will assist efforts to assure compliance
- Targeted review of submitted data and verifiers

Steps Ahead

- Share initial draft regulatory language
- Public workshop August 15
- Additional meetings with stakeholders
- Staff report and staff regulatory proposal by October 19
- Board hearing December 6 or 7

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www.arb.ca.gov/cc/cc.htm

CCAR Discussion Paper

Discussion Paper for a Petroleum Refining Greenhouse Gas Accounting and Reporting Protocol

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